

MEMORANDUM

To: Board of Regents

From: Board Office

Subject: Iowa State University's Proposal for an Interdepartmental Graduate Program in Sustainable Agriculture

Date: July 7, 2000

Recommended Actions:

1. Approve the proposed Interdepartmental Graduate Program in Sustainable Agriculture at Iowa State University, and refer to the Iowa Coordinating Council for Post High School Education (ICCPHSE) for review.
2. Request that Iowa State University review the recommendations of the Interinstitutional Committee on Educational Coordination (ICEC) prior to implementing the program.

Executive Summary:

Iowa State University is requesting approval of a new interdepartmental program (M.S. and Ph.D.) in Sustainable Agriculture. The proposed graduate degree program in Sustainable Agriculture would be the first of its kind in the United States. The University also proposes to offer, as part of this program, a graduate minor in Sustainable Agriculture.

The specific goals of the interdepartmental Graduate Program in Sustainable Agriculture (GPSA) are to: (1) provide students with the analytical and problem-solving skills required to meet the challenges confronting agriculture in the 21st century; (2) develop an innovative approach to graduate education that is interdisciplinary and interdepartmental; and (3) position Iowa State University at the forefront of institutions conducting research and extending knowledge about sustainable agricultural systems.

While a large number and wide range of interdisciplinary environmental studies programs exist at the undergraduate and graduate levels in the United States and around the world, there are few graduate programs focused on environmental issues in agriculture. Some land grant institutions have sustainable agricultural research projects and offer training and education programs, but such programs do not grant degrees.

Graduates of the GPSA will have highly marketable skills for careers in university research, education, extension, agricultural industry, governmental and non-governmental organizations, and farming.

Costs for the program are estimated to be: Year 1: \$79,000; Year 2: \$129,000; and Year 3 and thereafter: \$197,000, plus inflation. The largest portion of each year's budget is for graduate assistantships (from three in Year 1, to six in Year 2, to 10 in Year 3 and thereafter). Each core course, except one, is taught one semester every other year. Faculty loads have been negotiated so that no instructional costs will be incurred. The funding for a 1/4 secretary position -- \$10,000 per year (salary and benefits) has been made available from existing resources in the budget of the office of the Wallace Endowed Chair of Sustainable Agriculture. Funding is still being sought for guest speakers for GPSA colloquium and core courses (\$10,000 per year for travel, lodging, and honoraria). Consequently, ISU will work with departmental, college, and University committees hosting suitable speakers to see if visitors may also contribute to GPSA activities. Additional funds for program operations, including some of the graduate assistantships, will be pursued through private foundations and federal agencies.

The GPSA is consistent with the strategic plan of Iowa State University to become the nation's premier land grant institution. The proposed interdepartmental program reflects the University's emphasis on research programs related to agriculture, natural and social sciences, engineering technology, and stewardship of the environment, part of Goal 2 of the ISU strategic plan.

The proposed program is consistent with the Board of Regents Strategic Plan, specifically Objective 1.1.0.0, Improve the quality of existing and newly created educational programs. The relevant Strategies and Action Steps include:

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| Strategy 1.1.2.0 | Strengthen the quality of graduate and professional education at Regent institutions within the unique mission of each institution. |
| • Action Step 1.1.2.2 | Focus graduate programs to conform to unique missions of each university. |
| Strategy 1.1.4.0 | Strengthen research, creative work, and service by the Regent institutions. |
| • Action Step 1.1.4.1 | Each university enhance its research efforts consistent with its mission. |
| • Action Step 1.1.4.2 | Each university increase sponsored research consistent with its mission. |
| • Action Step 1.1.4.3 | Each institution increase its service to Iowans, nation, and world. |

Background and Analysis:

The intent of the proposed GPSA is to develop student competence and expertise in the design, implementation, and evaluation of sustainable agricultural systems. A key objective of the GPSA curriculum is to foster transdisciplinary and systemic thinking. The Board Office's review affirms that the intent and key objective are likely to be met.

The Board's *Procedural Guide* § 6.05 requires that proposals for new academic programs respond to questions of need/demand, quality, duplication, and cost, and the relationship of the program to institutional and Board strategic planning.

Need/Demand

Agriculture faces many pressing environmental, social, and agronomic challenges. There is growing recognition that an exclusive focus on increased production of food will be insufficient to meet the concerns of farmers and the non-farming public about food safety, nutritional security, environmental stewardship, and socially acceptable production technologies and food distribution systems. Sustainable agriculture offers a new cross-disciplinary approach in scholarship and service, providing students with a holistic perspective and focused training. Typically, programs in agriculture are taught along traditional discipline or field boundaries.

The University projects the following graduate enrollments:

	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005
Majors	8	20	30	35	35
Non-majors	4	12	15	20	20

The career paths available to graduates are likely to be in such fields as university research, education (both secondary schools and universities), and extension programs. The agricultural industry, government, and farming would also provide other opportunities.

Quality

To provide both the necessary information considered basic to the field as well as to establish a systems-oriented approach for studying agricultural sustainability, students in the proposed program would follow an interdisciplinary core curriculum comprised of five courses. They involve the subjects of agroecosystem analysis, integrated crop and livestock production systems, ecologically-based pest management strategies, organizational strategies for diversified farming systems, and society and technology in sustainable food systems. M.S. students would be required to take three of the five courses;

doctoral students would take all five. The five courses will be team-taught. All students and faculty of the program will be expected to participate in a weekly colloquium on sustainable agriculture. The proposed program would require M.S. students to take a minimum of six research or creative component hours and requires Ph.D. students to take 18 research credits.

A concern raised through the ICEC review process is that students may find it difficult to complete degree requirements in a timely manner due to the infrequency of key course offerings. The proposal indicates that each core course, with the exception of Sus Ag 509, is taught one semester every other year.

The proposed graduate minor in Sustainable Agriculture will require completion of three of the five core courses and three semesters of the colloquium for a total of 12 credits.

The ISU departments involved in the GPSA include:

- Agricultural and Biosystems Engineering
- Agronomy
- Animal Science
- Anthropology
- Entomology
- Horticulture
- Plant Pathology
- Sociology

The ICEC review also noted what may prove to be a major concern. The curriculum appears to lack coverage of several areas of public health, including agricultural worker safety and health and environmental health. While food safety is discussed, it may not be emphasized enough from a public health perspective. These areas could be addressed in collaboration with the University of Iowa College of Public Health.

Duplication

The program does not duplicate any others in the state. The evidence suggests that the particular emphasis of this program will be unique, even among land grant universities. Program officials have been in contact with other institutions relative to specific courses which appear to have similar content. Letters from persons at those campuses have been received which indicate that duplication does not exist; the writers encourage ISU to develop this program.

Costs

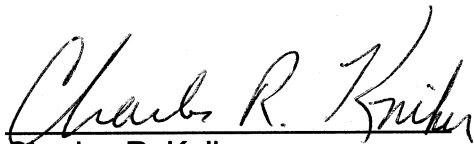
The GPSA is projected to have "marginal increases" in expenditures over the next three years of \$18,000 (Year One), \$17,000 (Year Two) and \$18,000 (Year Three). These expenses are associated with supplies, field trips, student recruitment, and support for the program's weekly colloquium. See Attachment A, page 17. While the costs for a brochure design and printing have been covered, the remaining costs are still under discussion within the administration of the College of Agriculture.

There are eight courses which are proposed as either new courses or modified courses. ISU asserts that to staff the interdisciplinary core courses, associated faculty members will have to be released from some of their current teaching duties. The report states that this issue has been addressed and resolved through discussions between individual faculty and their departmental executive officers. Funding for graduate assistantships, described as a major expense of the program, will be sought from foundations and other private sources as well as governmental programs.

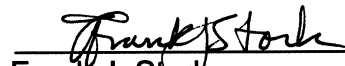
The program is consistent with the goal that ISU become the nation's premier land grant institution. The ISU Strategic Plan calls for an increased number of doctoral programs of national and international prominence. The proposed interdepartmental program fits within the University's emphasis on research programs related to agriculture, natural and social sciences, engineering technology and stewardship of the environment, part of Goal #2 of the ISU Strategic Plan. It also relates to Goal #3, strengthened outreach and extension.

Attachment A, pages 6 to 18, provides the University's responses to the Regent review questions for new programs.

The ICEC and Board Office recommend approval of the program, contingent upon the review by the Iowa Coordinating Council for Post High School Education. The University is urged to have program leaders review the concerns expressed during the ICEC review process. If approved, the program could begin as early as Fall 2000.


Charles R. Kniker

Approved:


Frank J. Stork

Graduate Program in Sustainable Agriculture

PART II: REGENT'S PROGRAM REVIEW QUESTIONS

1. NEED FOR THE PROPOSED PROGRAM

a. How will this proposed program further the education and curriculum needs of the students in this discipline?

As we note in Section 4 of Part I of this proposal, agriculture faces many pressing environmental, agronomic, and social challenges, including degradation of soil, air, and water quality; chemical and biological threats to food quality; new pests of crops and livestock; global climate change; heavy reliance on finite petrochemical energy reserves; loss of biological diversity; diminished rural community viability; and shrinking opportunities for young people. In addition to these challenges is the need to provide enough food for a rapidly expanding world population. Though the latter challenge might have stood preeminent in the past, in recent years there has been growing recognition that an exclusive focus on increased production will be insufficient to meet the concerns of farmers and the non-farming public about food safety, nutritional security, environmental stewardship, community viability, and socially acceptable production technologies and food distribution systems.

Over the past two decades, colleges of agriculture across the U.S. have studied these issues, proposed innovative technologies and new social structures to ameliorate them, and started to educate students about both the problems and their potential solutions. Despite recognition by many scholars that these issues must be approached in a holistic, interdisciplinary manner, most agricultural research and education continues to take place within the confines of traditional disciplinary boundaries. While there remains a need for specialized knowledge, there is an equally vital need to build bridges between fields of knowledge for constructing systematic and sustainable approaches to agriculture. *The Graduate Program in Sustainable Agriculture will serve the need for an interdisciplinary understanding of agricultural systems, while also providing students strength in and respect for specialized knowledge.* Graduates of the program will have both a holistic perspective and concrete training in sustainable farming practices and technologies. They will be oriented toward both the research needs and research applications of sustainable agriculture.

The interdisciplinary design of the program is aimed to encourage scholarship that is in tune with the complex needs of the agricultural industry and the rural and urban communities it serves. Equally important, the program will emphasize active learning, both in and out of classroom settings, by students in collaboration with farmers, business and civic leaders, researchers, extension personnel, and other members of the agricultural community.

Students graduating from the GPSA will be capable of developing solutions to problems throughout the world, wherever they may work. Program graduates will be critical thinkers and active learners with experience working efficiently in team environments. They will have highly marketable skills in research, education, management, and policy-making relevant to both the private and public sectors and to both domestic and international settings. We expect that many students in the program will come from Iowa, but also from

across the country and the rest of the world. Graduates of the program are likely to pursue careers in university research, resident and extension education, agricultural industry, government policy and technical service, non-governmental organizations, and farming.

In sum, as stated in Section 5 of Part I, our first objective for the GPSA is to:

Provide students with the analytical and problem-solving skills required to meet the challenges confronting agriculture in the 21st century. There is a growing demand for agricultural systems that increase food security, enhance human communities, and protect environmental quality. Accomplishing all of these things will require knowledge of agroecological principles and social relations underlying sustainable farming and food systems. Such knowledge will be available to students in the proposed program through an interdisciplinary curriculum that integrates information and skills from social and life sciences. As well, the program will emphasize higher-order critical thinking skills and active, collaborative approaches to engaged learning. Because students in the program will be drawn from many different states and countries, and because they will work eventually in an equally diverse set of locations, the curriculum will include local and global perspectives on sustainable agriculture. Students will be given a firm theoretical grounding and training in practical sustainable farming technologies.

b. How does it further the educational and curriculum needs of other units in the college or university?

The GPSA would be of great benefit to other units in the College and Agriculture and the rest of Iowa State. Faculty and constituents both in and out of Iowa State see a pressing need for an interdisciplinary focus on agriculture, taking into account the environmental and social demands of our agricultural production practices. The GPSA would help provide this needed focus. In addition, the GPSA would help Iowa State in its goal of becoming the country's leading land grant university. Thus, as we state in section 5 of Part I of this proposal, our second and third objectives for the program are to:

Develop an innovative approach to graduate education that is interdisciplinary and interdepartmental. The study and implementation of sustainable agricultural systems necessarily entails crossing traditional academic boundaries. Yet comparatively few institutional changes have been put into place in universities to promote interdisciplinary and interdepartmental work. The proposed program will foster dialogue among disciplines. Through new interdepartmental core courses that synthesize knowledge from diverse perspectives, it will equip students with skills and knowledge necessary to address production, environmental, and social problems encountered in agricultural systems. By training graduate students using a core curriculum of interdisciplinary courses emphasizing interconnections between natural resource management, crop and livestock production, pest management, agricultural technology, and community development, Iowa State University can provide critical leadership in the development of sustainable agricultural systems.

Such approaches can avoid problems of the recent past arising from insufficient understanding and appreciation of interrelationships between farms, non-farm ecosystems, and society.

Position Iowa State University at the forefront of institutions conducting research and extending knowledge about sustainable agriculture. ISU has a long history of agricultural leadership in Iowa and around the world. Over the past decade, ISU has gained national recognition for its commitment to promoting agricultural sustainability, including creation of the endowed Wallace Chair in Sustainable Agriculture. Additionally, members of the Leopold Center for Sustainable Agriculture and the USDA-ARS National Soil Tilth Laboratory have been recognized for major contributions toward the development of sustainable agricultural systems. Given this experience and the constellation of people currently working on campus, ISU has the opportunity to develop the best land grant university program in sustainable agriculture. By providing greater emphasis on graduate training in this field and by fostering the development of multidisciplinary systems research, ISU will attract a high quality group of students who would not otherwise be here. This will increase the university's prominence around the world.

Faculty and constituents in and out of Iowa State agree that the proposal would help lead the College of Agriculture in these important directions. To quote some of our letters of support from within the university,

"I am pleased to offer my strong support, encouragement, and endorsement for the Graduate Program in Sustainable Agriculture. I feel the College of Agriculture and Iowa State University are positioned to develop a world-class, highly visible program in this important area...Development to fruition of a sustainable, profitable, environmentally sound food-producing system is central to today's social needs in agriculture." (Professor Thomas Loynachan, Interim Head, Department of Agronomy, Letter of Support, Appendix C)

"I am pleased to write this letter of support for the proposed interdisciplinary program in sustainable agriculture. We view this program as having great potential and I feel sure that several of our faculty will become actively involved." (Professor Edward Braun, Chair, Department of Plant Pathology, Letter of Support, Appendix C)

"The development of sustainable food systems is critical to the future of Iowa and the world. We strongly support leadership in this emerging area at Iowa State University." (Professor Diane F. Birt, Chair, Department of Food Science and Human Nutrition, Letter of Support, Appendix C)

"Our department finds this to be an exciting and innovative proposal, one that fits well with our research mission and with our commitment to interdisciplinarity.... A Graduate Program in Sustainable Agriculture would help bring our faculty together with colleagues from other disciplines, as well as building a stronger cohort of

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graduate students in these areas. But most importantly, the program represents an important advance in the educational mission of Iowa State." (Professor Robert Schafer, Chair, Department of Sociology, Letter of Support, Appendix C)

"Over the years we have noted a lack of focus in the academic programs of the University dealing with agricultural research and teaching that is interdisciplinary and team-oriented. We are excited that a group of researchers and teachers in the College of Agriculture has stepped forward to fill this void." (Dr. Dennis Keeney, Director, Leopold Center for Sustainable Agriculture, Letter of Support, Appendix C)

Constituents outside the university concur that the GPSA would significantly enhance ISU's teaching, research, and extension missions:

"I enthusiastically support the development of a new interdisciplinary Graduate Program in Sustainable Agriculture at Iowa State University. Such a program will fill a vital need in the 21st century." (Richard E. Rominger, Deputy Secretary of Agriculture, US Department of Agriculture, Letter of Support, Appendix C)

"[T]he proposed program is a unique opportunity for Iowa State University to enhance its position as an innovative land grant institution." (Dr. L.V. Kaster, Group Leader for Trait Deployment, Garst Seeds, Letter of Support, Appendix C)

"My colleagues and I at the Center for Rural Affairs strongly support this program and look forward to its full implementation. We believe that by implementing it, Iowa State University will become a national leader among land-grant universities...." (Chuck Hassebrook, Director, Center for Rural Affairs, Letter of Support, Appendix C)

"I think there is a very great need for this kind of program right now and in the future. I commend the planning committee for their foresight and understanding in developing this graduate program. We at PFI strongly supports the efforts to bring this valuable program to ISU." (Colin Wilson, farmer and President, Practical Farmers of Iowa, Appendix C)

"I think the time is right for a Graduate Program such as the one outlined in the preceding proposal. I believe that biodiversity needs such a program. The Iowa Nature Conservancy strongly supports this proposal." (Keith Fletcher, Acting Director, Iowa Nature Conservancy, Letter of Support, Appendix C)

"I see great promise in your proposed program. Students will benefit and society will benefit because of what they are able and prepared to take on during their careers. I applaud you for developing the proposal and hope that Iowa State will see its great potential." (Charles Benbrook, CEO, Benbrook Consulting Services, Former Chair of the Board on Agriculture of the National Research Council, Letter of Support, Appendix C)

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"I am very excited to learn about the proposed graduate programs in sustainable agriculture being considered at Iowa State University and am pleased to write this letter of support for their development and eventual approval....In the past, we have invested quite heavily in land-grant universities around the country and have a significant record of investment at Iowa State University in particular. We've always considered Iowa State to be a leader in agriculture and in creatively addressing the significant food issues in this country and around the world. I'm not surprised to see Iowa State again in a leadership role in promoting sustainable agriculture by preparing the future professional who will need to deal with a volatile and dynamic food system for the 21st Century." (Rick Foster, Vice President for Programs in Food Systems, Rural Development, and Leadership, W.K. Kellogg Foundation, Letter of Support, Appendix C)

The proposed program is also strongly supported by academics from other institutions around the country for its interdisciplinarity, innovativeness, timeliness, and leadership.

"It is a pleasure to provide enthusiastic support for your new Interdisciplinary Graduate Program in Sustainable Agriculture....The degree curricula will be landmark programs for the Midwest and the US." (Professor Charles Francis, Director, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Letter of Support, Appendix C)

"I strongly support the proposal for an Interdisciplinary Graduate program in Sustainable Agriculture that you and your colleagues at ISU have put together. I hope this program will be approved by the regents of your university as it would be the first of its kind in the United States and would fill a major void in our educational system." (Associate Professor Miguel Altieri, College of Natural Resources, University of California-Berkeley, Letter of Support, Appendix C)

"I am pleased to endorse Iowa State University's effort to establish an interdisciplinary graduate program focusing on agriculture sustainability....The proposed program at ISU would fill an important niche. To the best of my knowledge, the program you are proposing is unique." (Professor Thomas Lyson, Director, Farming Alternatives Program, College of Agriculture and Life Sciences, Cornell University, Letter of Support, Appendix C)

"Let me begin by congratulating your faculty group at Iowa State for pursuing this graduate program....I believe the proposal is quite correct that your Graduate Program in Sustainable Agriculture would position Iowa State as the leader in this field across the country." (Professor Frederick H. Buttel, Chair, Department of Rural Sociology, College of Agriculture and Life Sciences, University of Wisconsin-Madison, Letter of Support, Appendix C)

2. RELATIONSHIP TO PROGRAMS AT OTHER IOWA COLLEGES AND UNIVERSITIES

a. What programs in this field of study are available in other colleges and universities in Iowa?

There are no graduate programs in this field of study available in Iowa, or indeed anywhere in the United States. (See quotations from the letters of support provided in section 1b above.)

b. With what representatives of these programs have you consulted in developing this proposal?

While there are no graduate programs in this field of study currently available in Iowa, we have consulted with faculty in related fields at both the University of Iowa and the University of Northern Iowa, including:

Edward J. Brown, Professor and Director of Environmental Programs, University of Northern Iowa

Barbara Hetrick, Professor and Head, Department of Biology, University of Northern Iowa

Laura Jackson, Associate Professor, Department of Biology, University of Northern Iowa

William Stigliani, Professor of Chemistry and Director of the Center for Energy and Environmental Education, University of Northern Iowa

Jerald L. Schnoor, Miller Distinguished Professor and Co-Director, Center for Global and Regional Environmental Research, University of Iowa

Letters of support from all of these individuals are attached in Appendix C of this proposal.

c. In what ways is this proposed program similar to those mentioned in 2a? In what ways is it different or does it have a different emphasis?

As the state's land grant institution, educational programs focusing on agriculture are housed at Iowa State. The programs mentioned above provide more focused training in some of the disciplines that the interdisciplinary Graduate Program in Sustainable Agriculture would draw upon, but without a specifically agricultural orientation. As Professor Brown of UNI observes,

"Although some content in the core course of UNI's graduate program in environmental science/technology addresses environmental sustainability, there is little relating specifically to sustainable agriculture." (Letter of Support from Professor Brown, Appendix C)

Professor Schnoor of U of I makes a similar observation:

"Iowa State is certainly the Regents institution which should house such a program in sustainable agriculture. I see no overlap with existing programs at other institutions." (Letter of Support from Professor Schnoor, Appendix C)

d. How does the proposed program supplement the current programs available?

The representatives of these other programs see a strong need for a graduate program in sustainable agriculture. As Professor Jackson of UNI notes,

"The University of Northern Iowa would definitely feed students into your program...I believe many of our students would be very attracted to your proposed Masters degree....Most of these students, however, are currently not looking at ISU for graduate school perhaps because they perceive the current degree programs as too classically agricultural and not enough environmental or ecological. In short, the new GPSA would persuade them that they could indeed 'fit in' and make a contribution at ISU." (Letter of Support from Professor Jackson, Appendix C)

Similarly, Professor Stigliani from UNI writes,

"The establishment of your graduate program would offer an exciting new option for our UNI students who wish to pursue a graduate degree in a burgeoning new field such as sustainable agriculture. I would be pleased to advise my students to explore that possibility..." (Letter of Support from Professor Stigliani, Appendix C)

Professor Hetrick of UNI states that,

"I believe that this is an important program to offer our future scientists. If ISU is to retain and enhance its reputation as a global center for agriculture research, it seems to me that this program must be part of the mosaic of research efforts." (Letter of Support from Professor Hetrick, Appendix C)

Professor Schnoor of the U of I has the following to say about the proposed program:

"It is extremely timely and will help Iowa State to remain a leader in agriculture and agroecosystems teaching and research....Now, with the implementation of this proposal, the importance of sustainable agriculture will be formalized as an academic program, and it will allow students the opportunity to enroll in this new paradigm of agriculture in the 21st century." (Letter of Support from Professor Schnoor, Appendix C).

e. Has the possibility of some kind of inter-institutional program or other cooperative effort been explored?

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We have had good discussions on this point with faculty from UNI and the University of Nebraska, and will be continuing these discussions, should the program be approved. At this stage, the clearest opportunities for cooperation lie in the development of complementary programs that provide greater options in graduate education for undergraduate students in Iowa. As several of the above quotations from letters of support indicate, the proposed GPSA would nicely fit with the career aspirations of undergraduates in Iowa and elsewhere, and we would work with other institutions in establishing good communication lines about the program. But more than that, there is also potential for faculty involvement in inter-institutional teaching and research efforts. While nothing has been formalized at this time in this regard, we are continuing these discussions with interested faculty and programs at other institutions. As Professor Jackson notes in her letter of support, "I look forward to increasing research collaboration with ISU and its students through the GPSA." As Professor Stigliani similarly observes in his letter, "I look forward to the day when we could collaborate with the GPSA, combining our expertise in lake water quality and watershed pollution modeling, with yours in sustainable management of agriculture lands in the watershed." We share these aspirations and will work on bringing them to fruition.

f. List the Iowa institutions in which articulation agreements are being developed for the proposed program.

Not applicable.

g. Provide the Classification of Instructional Program (CIP) code for the proposed program.

02.9999: Agricultural Sciences—other.

3. ESTIMATED ENROLLMENT IN THIS PROGRAM FOR THE NEXT FIVE YEARS

a. Undergraduate

Not applicable.

b. Graduate

	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005 ~
Majors	8	20	30	35	35
Non-Majors	4	12	15	20	20

c. On what basis were these estimates made?

We have attempted to make conservative estimates of the number of students. The main limiting factor will be the availability of assistantships. Based on our own experience, and on that of other academic institutions across the country, student interest is enormous, probably far larger than we will be able to support. As we note in Part I of this proposal, while he was at the University of Maine, heading up an undergraduate program in sustainable agriculture, ISU faculty member Matt Liebman annually received greater than two hundred inquiries from potential applicants interested in pursuing M.S. and Ph.D. degrees in sustainable agriculture. Here on the ISU campus, faculty members also receive constant inquiries about the availability of graduate degree programs in sustainable agriculture. There are great advantages for Iowa State, though, in such a "seller's market." As Charles Benbrook, CEO of Benbrook Consulting, notes, "I am certain you will be flooded with applicants and will be able to set high standards for admission."

d. What are the anticipated sources of these students?

Iowa State is already a highly visible institution in the area of sustainable agriculture, locally, nationally, and internationally. We anticipate that the bulk of our students would be from the US, with a disproportionate number from Iowa due to the important role of agriculture in the state and to some extent due to proximity. However, given that this will be the only program of its kind in the country, we predict that this disproportionality would be mainly due to the importance of agriculture in Iowa, not proximity. As an interdisciplinary program, the GPSA will encourage applications from students with a wide variety of backgrounds at the undergraduate level.

4. EMPLOYMENT OPPORTUNITIES FOR GRADUATES OF THIS PROGRAM

As we note in Part I of this proposal, there are a wide range of employment opportunities for students from a program such as the GPSA. Among the career paths that our graduates could be expected to follow are:

- *University research.* Increasingly, the agendas of granting agencies and colleges of agriculture are shifting to interdisciplinary approaches for improving agricultural sustainability. Graduates of the proposed program will be attractive to research universities orienting their work in this way.

- *Education.* Environmentally attuned educational programs have been established throughout the U.S. at both secondary school and university levels and are popular with students. This has created a need for professionals to carry out these programs.

- *University extension.* Across the country extension programs are starting to catch up with the unmet demand for information about sustainable agricultural systems. Graduates of the proposed program will be in demand to coordinate in-service training and to deliver information in the field to extension clients.

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- *Agricultural industry.* Graduates of the proposed program would be uniquely trained to help companies pursue opportunities created by agricultural sustainability issues. Program graduates may be especially useful in developing strategies that comply with increasingly stringent government environmental regulations.

- *Government.* Environmental policy analysts in government are often hampered by a lack of interdisciplinary training in agricultural issues. Graduates of the program would help broaden the vision required for successful government. Program graduates could also serve in technical capacities in state and federal agencies involved in resource management, such as the Iowa Department of Natural Resources, and the federal Natural Resources Conservation Service and Bureau of Land Management.

- *Non-governmental organizations.* Many non-governmental organizations deal with issues of environment, agriculture, and domestic and international development. These organizations seek professionals with interdisciplinary training in sustainable agriculture.

- *Farming.* We expect that many graduates of the program will apply their training directly in agricultural production as farmers (owner-operators).

Letters from potential employers support that these are realistic options. For example, writing from the perspective of government, Deputy Secretary of Agriculture Richard Rominger of the US Department of Agriculture notes:

"Your proposal could very well produce the scientists who will build on Aldo Leopold's call for a "land ethic"....Government agencies, especially the US Department of Agriculture, need these scientists in our own research efforts and in reviewing requests for grants from other research organizations, including Land Grant Universities." (Letter of Support from Deputy Secretary Rominger, Appendix C)

In the area of agricultural industry, Von Kaster of Garst Seeds observes:

"Agricultural businesses in the United States, as well as worldwide, are facing major challenges as we enter the 21st century....All of these changes and challenges provide agricultural businesses with opportunities to expand existing markets and enter new ones. Graduates of the proposed program will possess the skills that will enable them to contribute to those agriculture businesses seeking to take advantage of these changes, now and in the future." (Letter of Support from Dr. L.V. Kaster, Appendix C)

In the area of non-governmental organizations, Keith Fletcher, Acting Director of the Iowa Nature Conservancy, and Chuck Hassebrook, Director of the Center for Rural Affairs, note:

"The Conservancy plans to add another 400 landscape-scale projects to our conservation portfolio during the next five to ten years, many of them in the Midwest....Certainly, the skills, knowledge, and courses from this proposed Sustainable Agriculture Program would look very good on the resume of an applicant for one of these key, front-line conservation positions." (Letter of Support from Keith Fletcher, Appendix C)

"Students completing graduate degrees within the program you're proposing would be excellent candidates for positions at the Center and other non-profit, civil society organizations working in rural regions of the United States." (Letter of Support from Chuck Hassebrook, Appendix C)

And Colin Wilson, farmer and President of Practical Farmers of Iowa, writes that the program will provide a valuable academic foundation for graduates who wish to pursue a career as a farmer:

"As a farmer I can see a great deal of value in this program because of the multi-faceted decisions that I face on a regular basis. Many of the decisions we face as farmers require knowledge and understanding in several different disciplines....This program will be one of the few that would provide training in such a variety of subject areas." (Letter of Support from Colin Wilson, Appendix C)

5. ACCREDITATION STANDARDS FOR THIS PROGRAM

As this is the first program of its kind in the country, there are no accreditation standards for this program.

6. NATIONAL STANDARDS FOR THE PROGRAM

The Council of Graduate Schools has not yet reviewed this proposal to determine if it meets national standards for graduate education. However, given the extensive review that the proposal has already had from academics across the country, we are fully confident that the Council will approve the program.

7. REACTIONS OF THE IOWA COORDINATING COUNCIL FOR POST-HIGH SCHOOL EDUCATION

The Council has been contacted and informed about the proposed Graduate Program in Sustainable Agriculture. During a discussion about the program, Mr. Roger Foelske, Recording Secretary of the Council, recommended that we contact relevant units at the other regents universities in Iowa. We have done that, as shown in the attached letters, and will continue to keep Mr. Foelske and the Council informed as the program comes to fruition.

ADDITIONAL RESOURCE NEEDS

1. Probable Marginal Increases in Expenditure that May Be Necessary as a Result of the Adoption of this Program for the Next Three Years

The marginal increases in expenditure will be associated with supplies, field trips, student recruitment, and supporting the program's weekly colloquium. As we describe in Part I, the other program expenses will be handled from resources already available at ISU. As Section 9d of Part I notes, ISU's library already subscribes to the relevant journals and has an excellent collection of the relevant books and monographs. As we describe in Section 9f of Part I, graduate assistantships to support program students have been made available from existing departmental and other university resources. As well, funding from the 1/4 time secretary for the program has been made available from existing resources in the budget of the office of the Wallace Endowed Chair of Sustainable Agriculture. Letters describing and committing these resources are included in Appendix C.

The marginal increases in expenditure required for the program are:

Year 1: \$18,000
Year 2: \$17,000
Year 3: \$18,000

2. Nature and Justification for the Additional Resource Needs

Successful operation of the program will require funds for the following items:

- Supplies and mail: \$3,000 per year;
- Travel funds for field trips associated with core courses: 20 trips of 250 miles each at 40 cents/mile using university van rentals: \$2,000 per year;
- Brochure design and printing, 2000 copies: \$2,000 in first year, \$1,000 per year thereafter;
- Web site design and maintenance: \$1,000 per year.
- Speakers for GPSA colloquium and core courses: \$10,000 per year (travel, lodging, honoraria).

3. How the Additional Resource Needs Will Be Provided

As we note in the budget discussion in Part I, Dr. Eric Hoiberg, Associate Dean for State and Academic Programs in the College of Agriculture, has agreed to cover costs for brochure design and printing through his office (please see attached letter, Appendix C). Additional funds for supplies, mail, field trip mileage, and web site design and maintenance have not yet been secured but will be the subject of discussions with the administration of the College of Agriculture.

Furthermore, to date we have not secured funds to support a series of invited speakers for the GPSA colloquium. Consequently, we will work with departmental, college, and university committees hosting suitable speakers to see if visitors may also contribute to GPSA activities. Additional funds for program operations will be pursued through private foundations and federal agencies. As noted in the attached letter (Appendix C) from Dr. Charles Benbrook, former director of the Board on Agriculture of the National Research Council, "I ... think the program will be a magnet for foundation and government support."

We note that ISU may be especially well positioned to seek funds to support the GPSA from private philanthropic organizations. As noted in the attached letter (Appendix C) by Mr. Rick Foster, Vice President for Programs at the W. K. Kellogg Foundation:

"At the W. K. Kellogg Foundation and in many other foundations around the country, we continually look for opportunities to invest in and support issues of sustainability. We look for a critical mass of investment and the type of value system that is consistent with ours. We have been pleased to support Iowa State University through the current Henry Wallace Chair for Sustainable Agriculture, as well as the Vision 2020 project and the Integrated Farming Systems project that connects Iowa State University and the Practical Farmers of Iowa. We have also had numerous leadership development and rural development projects in Iowa over the years. We think Iowa State's ability to provide programs that reflect the integrity and cultural values of the state is very commendable. It represents an easy decision point for us when considering where to invest in the future."